

# Estimated hospital health costs of chronic abdominal pain in the Netherlands

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## ABSTRACT

**Aim:** Calculation of the hospital costs of chronic abdominal pain in the Netherlands.

**Design:** Cross-sectional study.

**Methods:** We selected 'Diagnosis-Related Groups' (DRG) of disorders that are associated with chronic abdominal pain from a large teaching hospital and a tertiary referral centre. For each DRG we determined the percentage of patients that can present with abdominal pain. The total costs for both hospitals were calculated using the registered quantity of the DRGs. Each DRG was categorised by somatic and functional origin. The results were subsequently extrapolated to the entire Dutch population demanding hospital care for chronic abdominal pain. Finally, the percentage and associated costs were calculated for patients who had two or more separate diagnoses for chronic abdominal pain in the field of gastroenterology, gynaecology, internal medicine and urology.

**Results:** The yearly outpatient and (day) clinical health costs for patients with chronic abdominal pain in the Netherlands were approximately €623 million (gastroenterology €226 million; gynaecology €303 million; internal medicine €63 million; and urology €31 million). Of these diagnoses, 53.6% were related to functional disorders, which accounts for approximately €220 million per year. The yearly costs of patients who had at least two separate diagnoses within one year for chronic abdominal pain were estimated at €23.5 million per year.

**Conclusion:** Chronic abdominal pain is a common problem that entails significant healthcare costs in the Netherlands of which functional diagnoses compromise a significant amount.

## KEYWORDS

Chronic abdominal pain, DRG (diagnosis-related groups), functional disorders, healthcare costs, secondary and tertiary care

## INTRODUCTION

Chronic abdominal pain is a frequently reported symptom in the general practitioners (GP) practice.<sup>1</sup> It occurs more often in women and is defined as recurring pain that persists for at least six months that is not related to the menstrual cycle.<sup>2,3</sup> Of patients who consult their GP for chronic abdominal pain, 18-20% have an underlying organic cause.<sup>2</sup> Hence, the majority of patients (i.e. approximately 80%) have a functional disorder.<sup>2</sup> In the Netherlands, approximately 500,000 patients with chronic abdominal pain are seen by GPs per year. Fifty percent of patients who suffer from abdominal pain will eventually be referred to a secondary or tertiary referral centre.<sup>3</sup>

We aimed to gain insight into the outpatient and (day) clinical healthcare costs of patients with chronic abdominal pain in the Netherlands. The importance of this study is underscored by the problematic rise in Dutch healthcare costs that has increased from 7.5% of the gross domestic product in the early 1970s to 13% nowadays. More than €80 billion per year is spent on healthcare in the Netherlands.<sup>6</sup> Better insight into healthcare costs of patients suffering from chronic abdominal pain might result in the development and implementation of cost reduction strategies.

## METHODS

The DRG (Diagnosis-Related Groups) datasets of the Academic Medical Centre (AMC, Amsterdam, the Netherlands) and a large teaching hospital (St. Antonius Hospital, Nieuwegein, the Netherlands) were analysed. These datasets contain all DRGs that were closed in the year 2010 in both hospitals in the field of gastroenterology, gynaecology, internal medicine, and urology. Diagnoses were selected that are associated with chronic abdominal pain, excluding upper abdominal pain. A literature review was conducted in order to determine the percentage of patients who can present with chronic abdominal pain for each diagnosis. This resulted in a weighting factor for chronic abdominal pain per diagnosis (table 1). This weighting factor was multiplied by the number of patients and DRGs for each diagnosis for both hospitals. For example, the weighting factor for Crohn's disease is 0.83 which means that 83% of patients with Crohn's disease present with chronic abdominal pain. If in one year in a particular hospital 100 DRGs for Crohn's disease are closed, the calculation would be as follows:  $0.83 \times 100 = 83$  DRGs. In contrast to gastroenterologists, gynaecologists and internists, urologists systematically register the main symptom for each patient in the DRG registration system. Therefore, the weighting factor for urology-related diagnoses is 1.

### DRG rates

DRG prices for 2010 were obtained from the website of the Dutch Healthcare Authority (Nederlandse Zorgautoriteit,

NZa). The price of each DRG for the St. Antonius Hospital and AMC was determined using an online application tool. The healthcare costs were calculated by multiplying the price per DRG with the patient number for each DRG, including the costs of outpatient and (day) clinical treatment.

### Extrapolation to the entire Dutch population

The total number of outpatient visits for all Dutch academic hospitals in 2010 was divided by the number of outpatient visits to the AMC for that same year.<sup>7</sup> For the St. Antonius Hospital a similar calculation was performed for all non-academic hospitals. The ratios were subsequently used to calculate the healthcare costs for all teaching hospitals and tertiary referral centres in the Netherlands, for both somatic and functional diagnoses.

### Operation codes

The costs of selected DRGs are not always entirely attributable to chronic abdominal pain. For this reason, operation codes were determined for five randomly selected patients using the same dataset for three random DRG codes for gastroenterology, gynaecology, internal medicine and urology. Next, we assessed which operations are associated with chronic abdominal pain. To calculate the costs, reference prices from the Manual for Cost Research and rates of the Dutch Healthcare Authority were used.<sup>11,12</sup> A gynaecologist (E.K.) and a gastroenterologist (M.L.) indicated which operations were related to the work-up of patients suffering from chronic abdominal pain. In

**Table 1.** Diagnoses that are associated with chronic abdominal pain in the field of gastroenterology, gynaecology, internal medicine and urology and the corresponding weighting factors. Functional diagnoses are highlighted by the asterisk sign (\*)

Gastroenterology	Gynaecology	Internal medicine	Urology
Chronic abdominal pain* 1	Abdominal pain, no gynaecological cause* 1	Abdominal pain without diagnosis* 1	Renal tumour 1
Irritable bowel syndrome* 1	Benign adnexal abnormality 0.78	Irritable bowel syndrome* 1	Kidney stone 1
Ischaemia 0.94	Endometriosis 0.69	Ischaemia 0.94	Nephritis 1
Crohn's disease 0.83	Malignancy ovarian 0.45	Crohn's disease 0.83	Bladder tumour 1
Infectious-(entero) colitis 0.8	Colorectal cancer 0.44	Infectious (entero) colitis 0.8	Ureter stone 1
Chronic obstipation 0.56	Prolapse 0.44	Chronic obstipation 0.56	Bladder infection 1
Ulcerative colitis 0.52	Pelvic inflammatory disease/ tuba-ovarian abscess 0.3	Ulcerative colitis 0.52	Benign prostatic obstruction 1
Colorectal cancer 0.44	Fibroid 0.27	Colorectal cancer 0.44	Several urological diseases 1
Diverticulitis 0.33	Cervix carcinoma 0.17	Diverticulitis 0.33	Other bladder pathologies 1
	Endometrium carcinoma 0.17		Prostate inflammation/abscess 1
	Chorionic carcinoma 0.05		Congenital renal pathology 1
	Extra uterine gravidity 0.05		Bladder problems* 1
	Sexual problems * 0.02		Prostatodynia/ Chronic pelvic pain * 1
			A-(hypo) contractile bladder* 1
			Urge incontinence/ overactive bladder 1
			Various urological disorders 1
			No urological disorder* 1

addition, a weighting factor was calculated by dividing the costs that were related to chronic abdominal pain by the total costs. These weighting factors were multiplied by the total DRG cost price resulting in healthcare costs that were related to chronic abdominal pain. To examine whether the costs of randomly selected DRG codes corresponded with the transaction codes, outcomes were analysed using SPSS (software version 20).

### Costs of two separate diagnoses of functional abdominal pain

The costs of two separate diagnoses (defined as different DRGs that were opened for the same symptom by at least two different specialists within one year) were calculated using a second DRG dataset from the St. Antonius Hospital. This dataset included patients with the following functional DRGs: abdominal pain without gynaecological cause, chronic abdominal pain, dyspareunia, irritable bowel syndrome, no urological diagnosis and hypo/contractile bladder. For each functional diagnosis, the number of patients who visited at least two different specialists for the same symptom within one year was examined.

## RESULTS

### Healthcare costs of patients with chronic abdominal pain

The total healthcare costs of patients with chronic abdominal pain in the St. Antonius Hospital and the AMC in 2010 were estimated at €18.8 million and €2.1 million, respectively (table 2).

### Extrapolated healthcare costs of chronic abdominal

The ratios for the St. Antonius Hospital and AMC were 45.4 and 8.3, respectively. In order to extrapolate the calculated costs to the Dutch situation, outcomes of the St. Antonius Hospital were multiplied by 45.4 and for the AMC by 8.3. The cost price of all DRGs for patients with chronic abdominal pain in all Dutch teaching hospitals and tertiary referral centres was approximately €850 million and €17.7 million, respectively (table 3). The total costs of DRGs that were related to chronic abdominal pain were estimated at €870 million in 2010 (table 3).

### Transaction codes

Weighting factors were calculated using transaction codes in order to convert the calculated costs into actual costs related to chronic abdominal pain (table 3). The weighting factors were 0.67 with a standard deviation (SD) of 0.16 for gastroenterology, 0.75 with an SD of 0.19 for gynaecology, 0.88 with an SD of 0.11 for internal medicine, and 0.57 with an SD of 0.24 for urology. These weighting factors were multiplied by the total cost per DRG. The Dutch healthcare costs that are related to chronic abdominal pain in secondary and tertiary care were estimated at €623 million per year (table 3).

Next, we examined whether the costs of the transaction codes corresponded with the costs of the selected DRG codes. To this end, the costs of randomly selected patients were compared with the price that is related to the DRG code. Nine out of 12 codes that were selected did not show a significant difference ( $p > 0.05$ ).

### Costs of functional abdominal pain

Of DRGs for patients with chronic abdominal pain, 53.6% were related to a functional disorder. The healthcare costs of patients with chronic abdominal pain due to a functional disorder were estimated at €220 million per year, and this accounts for 35.3% of the total healthcare costs of patients with chronic abdominal pain: 64% of €220 million is related to gastrointestinal diseases. Of the patients with a functional disorder (i.e. 3435 out of 7096 functional DBCs) within the speciality of gastroenterology and internal medicine, 48.4% were diagnosed with irritable bowel syndrome (IBS). Patients with IBS are responsible for 36.7% of the total hospital costs of functional abdominal pain.

### Healthcare costs of patients with chronic abdominal pain caused by two separate diagnoses

Of the patients with a functional diagnosis, 3.9% were seen by at least two specialists (gastroenterologist, gynaecologist and/or urologist) for the same symptom within a one-year time frame. Approximately 31.5% of the total costs (163,000/518,000) are spent on functional abdominal pain. When these results are extrapolated to the entire Dutch population, the costs of two or more separate diagnoses for chronic abdominal pain are approximately €23.4 million per year, of which €7.4 million is spent on functional disorders.

**Table 2.** Health care costs of patients with chronic abdominal pain in the AMC and St. Antonius Hospital in the year 2010

	Gastroenterology	Gynaecology	Internal medicine	Urology	Total
St. Antonius	€7,356,792	€8,753,018	€1,515,533	€1,194,636	€18,819,979
AMC	€460,530	€811,592	€818,972	€40,915	€2,132,009
Total	€7,817,322	€9,564,610	€2,334,505	€1,235,551	€20,951,988

**Table 3.** Extrapolated total (corrected) health care costs in the Netherlands of chronic abdominal pain in 2010 for gastroenterology, gynaecology, internal medicine and urology

	Gastroenterology	Gynaecology	Internal medicine	Urology	Total
Non-academic hospitals	€333,998,357	€397,387,017	€64,537,682	€54,236,457	€850,159,513
Academic hospitals	€3,822,399	€6,736,214	€6,797,468	€339,591	€17,695,675
Total	€337,820,756	€404,123,231	€71,335,150	€54,576,048	€867,855,185
Corrected total	€226,339,906	€303,092,423	€62,774,932	€31,108,347	€623,315,608

## DISCUSSION

Chronic abdominal pain is a common problem that is associated with an impaired quality of life and high treatment and diagnostic costs. Hence, it is important to gain more insight into this multifactorial symptom.<sup>3,4</sup> Here, we have analysed the healthcare costs of patients with chronic abdominal pain in secondary and tertiary care in the Netherlands using DRG datasets from an academic and a large teaching hospital. This study is an important first step towards transparency about healthcare costs in general and of patients with chronic abdominal pain in particular. The present study has its limitations. First of all, it is questionable to what extent international literature can be extrapolated to the Dutch situation with strong adherence of patients to their general practitioner. Secondly, calculations were made using DRG datasets from an academic and a non-academic hospital. These outcomes were extrapolated to the entire Dutch population and are therefore an estimation of reality. Moreover, it should be noted that DRG cost prices are fixed prices that are comparable with the real prices in daily practice. This does not necessarily mean that the price per DRG reflects the actually incurred costs. ‘Operation codes’ were therefore used to determine abdominal pain-related DRG costs employing randomly selected patients from the DRG datasets and the operation codes.

A significant difference was seen in the number of patients with chronic abdominal pain who were referred to the AMC and St. Antonius Hospital: 1990 patients were referred to the department of gastroenterology, gynaecology, internal medicine, or urology in the AMC in one year, whereas 23,359 patients visited these specialities at the St. Antonius Hospital. This explains the difference in healthcare costs between these two hospitals, as depicted in *table 3*, and illustrates the role of academic tertiary care providers.

The present study reveals that more than half (53.6%) of patients with chronic abdominal pain have a functional diagnosis. Interestingly, within one year 3.9% of these patients had at least two separate diagnoses for the same symptom. This is very likely an underestimation since we only used a one-year time frame for the analysis. IBS

is a functional bowel disorder of unknown aetiology, and is the most common gastrointestinal disorder in the GPs practice. The prevalence and incidence of IBS in the GPs practice is 10.5 per 1000 and 5.6 per 1000, respectively.<sup>8</sup> On average the GP sees two patients with IBS per week. Here we show that IBS patients are responsible for high healthcare costs (82.4 million per year) in secondary and tertiary care, which equals 36.7% of the total healthcare costs of functional abdominal pain. Identification of patients with functional abdominal pain might result in the development and implementation of cost reduction strategies. It has for example been shown that these patients may benefit from receiving information and nutritional and lifestyle advice. Moreover, psychotherapy and pelvic physiotherapy might be effective in treating these patients.<sup>9,10</sup>

## CONCLUSION

Patients with chronic abdominal pain frequently visit their GP. About 50% of these patients are referred to a (non)academic hospital.<sup>2,3</sup> We demonstrate here that approximately €623 million per year is spent in the Netherlands on hospital costs for patients with chronic abdominal pain. This equals 0.9% of the total Dutch healthcare budget.<sup>6</sup> Approximately 50% of patients with chronic abdominal pain have a functional disorder and this patient subgroup is responsible for high diagnostic and treatment costs (approximately €220 million per year). A significant proportion (3.9%) of patients with a functional diagnosis is referred to two or more specialists within one year for the same symptom. Cost reduction strategies that are aimed at identifying and treating patients with functional abdominal pain might result in a reduction of healthcare expenses.

## DISCLOSURES

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